REMARKS/ARGUMENTS

This reply is <u>fully responsive</u> to the Office Action dated 17 MARCH 2008, and is filed within five - (5) months following the mailing date of the Office Action. The

5 Commissioner is authorized to treat this response as including a petition to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed. The method of payment and fees for petition fee due in connection therewith is enclosed.

10   **Disclosure/Claims Status Summary:**

This application has been carefully reviewed in light of the Office Action of March 17, 2008, wherein:

A. The rejection of Claims 1-42 under 35 U.S.C. § 101, as being directed to non-

15 statutory subject matter, was withdrawn;

B. The Applicants Affidavit filed December 18, 2007, was rendered moot in view of new grounds of rejection based on newly introduced prior art presented in this Office Action;

C. The rejection of Claims 1-42 under 35 U.S.C. § 103(a) as being unpatentable over a

20 publication submitted by Sangiovanni-Vincentelli was withdrawn;

D. The rejection of Claims 1-42 under 35 U.S.C. § 103(a) as being unpatentable over a conference proceedings submitted by Chang et al. was withdrawn;

E. Claims 1-42 were rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement; and

25 F. Claims 1-42 were rejected under 35 U.S.C. § 102(b) as being anticipated by a conference proceedings submitted by Ruehli et at. and titled "Progress in the Methodologies for the Electrical Modeling of Interconnects and Electronic Packages," Proceedings of the IEEE, Vol. 89, No. 5, May 2001, pages 740-771 (hereinafter referred to as "the Ruehli publication").

30

Claim Rejections - 35 U.S.C. § 112

E. Turning now to the Office Action, the Examiner rejected Claims 1-42 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

5   **Claims 1-42 rejection under 35 U.S.C. § 112**

The Examiner stated that the claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

10

Specifically the Examiner stated that the amendments to the claims, consisting of modifying the "matrix based wavelet" term to a "wavelet-based matrix" term, amounts to a larger issue than merely a typographical error (referring to page 2 of the current Office Action). The Examiner stated that the Applicants stated that this amendment

15   constituted a typographical error and that the Applicants have provided what they term "indirect support" for this amendment as per page 13 of the Applicants' remarks dated 18 December 2007.

The Examiner stated that no evidence has been provided that the "wavelet-Galerkin

20   method to derive a matrix" as recited in specification of the instant application is identical to the "wavelet based matrix" currently disclosed in the claims. The Examiner supports this argument by stating that the Applicants' specification states that "the wavelet-Galerkin method is for exemplary purposes only, and is not intended to limit the scope of the present invention" (referring to paragraph 76 of specification).

25

The Examiner further stated that this argument is further supported by the claims recitation of generating by either a wavelet-Galerkin method, directly from a system diagram or from equations that describe the system. The Examiner noted that MPEP 2163.06 states "If new matter is added to the claims, the examiner should reject the

30   claims under 35 U.S.C. 112, first paragraph - written description requirement. *In re*

Rasmussen, 650 F.2d 1212, 211 JJSPQ 323 (CCPA 1981)." The Examiner stated that MPEP 2163 I-B further states "New or amended claims which introduce elements or limitations which are not supported by the as-filed disclosure violate the written description requirement. *In re Lukach*, 442 F.2d 967, 169 USPQ 795 (CCPA 1971)."

5

RESPONSE:

The Applicants submit that although the wavelet-Galerkin method is for exemplary purposes only and does not limit the scope of the present invention, **this wavelet-Galerkin method is presented in the original specification as a clear example of how**

10 **to derive the individual elements of a matrix by using a wavelet transform, which directly corresponds to how to generate a "wavelet-based matrix."**

The Applicants further submit that this statement, "in one aspect, the present invention uses the wavelet-Galerkin method to derive a matrix representative of the system to be

15 analyzed," (referring to the original specification page 10, lines 19-20, paragraph 62) clearly shows that a "wavelet based matrix" which consists of a matrix being formed by individual elements being computed or determined by using a wavelet transform, as commonly known by one skilled in the relevant art, is described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors,

20 at the time the application was filed, had possession of the claimed invention, as required by 35 U.S.C. § 112, first paragraph. Therefore, the Applicants emphasize that **it is commonly know in the art that a matrix can have its individual matrix elements determined by using a wavelet transform, consequently the term "wavelet-based matrix."**

25

The Applicants further submit that the wavelet transform by which the individual elements of the matrix are computed could be any number of wavelet transforms, wherein one such non-limiting example of a wavelet transform is a wavelet-Galerkin method.

30

The Applicants submit that further evidence that the correct terminology of "wavelet-based matrix" must be used throughout the claims and the present application is provided by the declaration under 37 CFR 1.132 previously filed on December 18, 2007, and signed by the principal inventor, Dr. George C. Valley. Dr.

5 George C. Valley, is an expert in the field of numerical solution of time-domain equations for physical systems who received a Ph. D in Physics from the University of Chicago in 1971, and who has conducted research in the numerical solution of time-domain equations for physical systems for the last 20 years (as evidenced by the declaration under 37 CFR 1.132 filed December 18, 2007).

10

The Applicants submit that after the principal inventor, Dr. George C. Valley, reviewed the original set of claims while consulting with us regarding amending the original claims during the previous response to the Final Office Action dated July 13, 2007, **Dr. Valley pointed out that the term "matrix-based wavelet operator" previously used on the**

15 **original specification and claims is a typographical error, and that this term "matrix-based wavelet operator" should actually read as "wavelet-based matrix operator, since the "matrix" and "wavelet" terms were swapped with each other by mistake"** Accordingly, the Applicants amended all the affected original claims, during the Applicants submission filed on December 18, 2007, using the term "matrix-based

20 wavelet operator," to include the correct term "wavelet-based matrix operator" through out the claims. As previously stated and repeated here for clarity, support for the correction of this typographical mistake can be found on the second and third paragraphs of the second page of the declaration under 37 CFR 1.132, signed by the inventor and submitted along with the previous response.

25

In light of the fact that the term "wavelet-base matrix" is a concise term well-know by any person skilled in the art of wavelet transforms and numerical solution of time-domain equations, and due to the fact that one reasonably skilled in the art could make or use the invention from the disclosures in the patent coupled with information known in the art

30 (such as computing a "wavelet-based matrix" by computing the individual coefficients of

the wavelet-based matrix by using a wavelet transform) without undue experimentation, the Applicants respectfully request that the rejection of Claims 1 thru 42 under the first paragraph of 35 U.S.C. § 112 be withdrawn.

5

Claim Rejections - 35 U.S.C. § 102(b)

Examiner's rejections of Claims 1-42 over the Ruehli publication

F.   In page 5 of the Office Action, the Examiner rejected Claims 1-42
10   under 35 U.S.C. § 102(b) as being anticipated by the Ruehli publication.

Claims 1, 15, and 29

Regarding the independent Claims 1, 15, and 29, the Examiner stated that the Ruehli publication discloses generating a wavelet-based matrix operator representation of time-
15   domain equations characterizing a mixed signal system, with the wavelet-based matrix operator representation including wavelet connection coefficients (referring to the Ruehli publication, page 741, right column, last paragraph, "wavelength of interest;" and page 743, left column, last paragraph, "inductive coupling coefficients;" and page 759, left column, second paragraph, "wavelet expansions"), and that the Ruehli
20   publication further discloses selecting a number of wavelets, a set of wavelet basis functions, and the wavelet-based matrix operator with which to represent a time domain performance of the system (referring to the Ruehli publication, page 743, right column, last paragraph, "finite-difference time domain method")

25   The Examiner further stated that the Ruehli publication discloses iteratively applying the wavelet-based matrix operator within each clock period and sequentially over a large number of clock cycles to calculate a time-domain response of the mixed signal system, wherein calculation within each clock period is weakly non-linear, and wherein the calculation within each clock period is performed by matrix multiplication (referring to
30   the Ruehli publication, page 743, right column, second paragraph, "iterative solver;"

page 763, left column, equations 4.40 and 4.41; and page 767, left column, second paragraph, "time interval of interest").

Finally, the Examiner stated that the Ruehli publication discloses outputting the time-

5　　domain response of the mixed signal system to an user, whereby the user can utilize the time-domain response of the mixed signal system to evaluate the behavioral performance of the system (referring to the Ruehli publication, page 741, left column, third paragraph, "electromagnetic behavior of the interconnect structure").

10　**RESPONSE:**

I.　The cited prior art does not establish a prima facie case of anticipation

Addressing the requirements of anticipation, the Federal Circuit stated that "There must

15　　be no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention" *Scripps Clinic & Research Found. V. Genentech Inc.*, 927 F.2d 1576 (Fed. Cir. 1991). Furthermore, the Federal Circuit stated that "Anticipation requires that every element of the claims appear in a single reference ..." *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264 (Fed.

20　　Cir. 1991), and that "Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration." *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983). In addition, the Federal Circuit further stated that under 35 U.S.C. § 102, "anticipation requires the presence in a single prior art reference disclosure of each and every element of the claimed invention,

25　　arranged as in the claim*" Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452 (Fed. Cir. 1984).

Therefore, in order to establish a prima facie case of anticipation the Examiner must set forth an argument that provides (1) a single reference (2) that teaches or enables (3) each

30　　of the claimed elements (as arranged in the claim) (4) either expressly or inherently and

(5) as interpreted by one of ordinary skill in the art. All of these factors must be present, or a case of anticipation is not met.

Upon a thorough review of the Ruehli publication the Applicants assert that the Examiner

5   has failed to establish a single reference that teaches or enables each of the elements of the claimed invention. Specifically, the cited prior art fails to teach the elements of **(a) iteratively applying the wavelet-based matrix operator within each clock period (emphasis added)** and sequentially over a large number of clock cycles to calculate a time-domain response of the mixed signal system, **(b) wherein calculation within each**

10   **clock period is weakly non-linear (emphasis added), and (c) wherein the calculation within each clock period is performed by matrix multiplication** as recited on independent Claims 1, 15, and 29 of the present invention.

The Applicants assert that, in contrast to the present invention, the Ruehli publication

15   does not teach or even suggests **"iteratively applying a wavelet-based matrix operator within each clock period," "wherein calculation within each clock period is weakly non-linear," and "wherein the calculation within each clock period is performed by matrix multiplication."** Specifically, the Applicants submit that the present invention performs a set of internal iterations within a clock period (i.e., iteratively applying a

20   wavelet-based matrix operator within each clock period), which are nested within a second set of external iterations performed over a large number of clock cycles, as clearly disclosed in the independent Claims 1, 15, and 29, and the Applicants emphasize that the Ruehli publication does not teach or even suggests to perform this internal set of iterations within a clock period (or within a single grid of the Ruehli publication) and that

25   the Ruehli publication does not teach or even suggests that the clock period is weakly non-linear.

The Applicants further submit that in contrast with the present invention, the Ruehli publication does not specifically disclose working with wavelet transforms but slightly

30   mentions "wavelet expansions" (referring to page 759, left column, second paragraph),

and that the Ruehli publication actually discloses using Laplace transforms. The Applicants submit that there are multiple methods to characterize a system and that the fact that Wavelets are used to solve differential equations is well known, but that does not mean that those methods are equivalent or even similar to the method disclosed by the

5   present invention. **The Applicants suggest that the Examiner should actually review some of the basis of signal processing and transform theory before the Examiner formulates his rejections based exclusively on the general concept of using wavelets to characterize a system.**

10

The Applicants submit that the fact that wavelets are used to solve differential equations is well known, however, none of the cited prior art discloses how to make a matrix operator to use over a clock period to speed up the simulation of mixed signal circuits, which are defined to include nonlinear analog components and sharp time variations at

15   the clock period of the digital part of the circuit.

The Applicants assert that the "wavelet expansions" mentioned by the Ruehli publication (referring to page 759, left column, second paragraph) do not teach or even suggest using the "wavelet expansions" (wavelet-base matrix operator approach) within a single clock

20   period by iteratively applying the "wavelet expansions" (wavelet-based matrix operator) within each clock period and sequentially over a large number of clock cycles to calculate a time-domain response of the mixed signal system, as disclosed by the present invention. The Applicants submit that the Ruehli document does not even disclose working with time-domain responses.

25

The Applicants further submit that the Ruehli document does not work with clock periods or clock cycles, but instead the Ruehli document discretizes elements by implementing a non-uniform grid (referring to page 743, right column, second paragraph), which the Examiner is suggesting is equivalent to separating a time-domain signal into separate

30   clock cycles, in a extremely broad sense. The Applicants respectfully remind the

Examiner that in order to establish prima facie case of anticipation, the Examiner must set forth an argument that provides (1) a single reference (2) that teaches or enables (3) each of the claimed elements (as arranged in the claim) (4) either expressly or inherently and (5) as interpreted by one of ordinary skill in the art. All of these factors must be

5   present, or a case of anticipation is not met.

Furthermore, the Applicants submit that the Ruehli publication teaches using Laplace transforms to develop electromagnetic models and simulations, by exclusively applying the Laplace transforms to the state-vector representations using matrix multiplications

10   (referring to page 763, left column, equations 4.40 and 4.41) across the entire set of non-uniform grids without having a second set of computations or nested iterations within the individual non-uniform grids, in order to generate a model or a simulation. **In contrast, the present invention breaks the computations for a large number of clock cycles into computations within each clock period, in order to iteratively apply the wavelet-**

15   **based matrix operator specifically within each clock period (emphasis added) and sequentially over a large number of clock cycles** throughout the duration of the entire simulation, as disclosed in Claim 1.

Therefore, Applicants respectfully refer the Examiner to the fact that there are two

20   **separate and distinct sets of iterations disclosed by the present invention.** The Applicants refer the Examiner to the present invention page 11 paragraphs 64 and 65, and to Claim 1, where it is clearly disclosed that the present invention provides a technique in which a system simulation is broken up into clock periods and **several iterative computations are performed within each clock period**, in order to simulate the non-

25   linearities within a clock period, wherein each clock period in a simulation requires one wavelet transform of the input and any applicable feedback signals in the system. **At the same time, the present invention also performs an external and separate set of iterations over a large number of clock cycles** to calculate a time-domain response of the mixed signal system, similar to the iterations disclosed by the Ruehli publication.

30

Therefore, the Applicants emphasize that the internal iterations performed within a clock period, as disclosed by the present invention, are nested within the external iterations performed over a large number of clock cycles, as further disclosed by the present invention. The Applicants submit that the Ruehli publication may be disclosing some

5   kind of the external iterations performed over a large number of grids, but that the Ruehli publication does not teach or even suggests "**iteratively applying a wavelet-based matrix operator within each clock period (grid).**

Furthermore, the Ruehli publication does not teach or even suggest that the **calculation**

10   **within each clock period is weakly non-linear (emphasis added), and that the calculation within each clock period is performed by matrix multiplication.**

Therefore, **the Applicants request that the Examiner please indicate exactly where (page number, column number, and line number)** on the Ruehli publication, **the**

15   **Examiner finds that the limitation of** "iteratively applying the wavelet-based matrix operator **within each clock period** (emphasis added) or even within a grid, and sequentially over a large number of clock cycles to calculate a time-domain response of the mixed signal system, wherein **calculation within each clock period is weakly non-linear** (emphasis added), and **wherein the calculation within each clock period is**

20   **performed by matrix multiplication,**" as is disclosed in Claims 1, 15, and 29.

Therefore, the Applicants submit that the Ruehli publication, in combination with the knowledge of one skilled in the art, does not teach, disclose or suggest expressly or inherently all of the claim limitations of Claims 1, 15, and 29 as arranged in Claims 1, 15,

25   and 29.

Because the Ruehli publication fails to teach all the elements of independent Claims 1, 15, and 29 as arranged in Claims 1, 15, and 29, for at least the reasons discussed above, the Applicants respectfully request that the Examiner withdraw this rejection of Claims 1,

30   15, and 29 as arranged in Claims 1, 15, and 29 under 35 U.S.C. § 102(b).

Dependent Claims

Claims 2-14 are dependent upon Claim 1, Claims 16-28 are dependent upon Claim 15, and Claims 30-42 are dependent upon Claim 29. For at least the reasons given above, the

5   Applicants submit that Claims 1, 15, and 29 are patentable over the cited prior art. Therefore, in addition to the reasons set forth above, the Applicants submit that Claims 2-14, 16-28, and 30-42 are also patentable over the cited prior art at least based on their dependence upon an allowable base claim.

Closing Remarks:

The Applicants respectfully submit that, in light of the above remarks, the application and all pending claims are now in allowable condition. Therefore, reconsideration is respectfully requested. Accordingly, early allowance and issuance of this application is

5   respectfully requested.

In the event that the Examiner wishes to discuss any aspect of this response, or believes that a conversation with either the Applicants or Applicants' representative would be beneficial the Examiner is encouraged to contact the undersigned at the telephone number

10   indicated below.

The Commissioner is authorized to charge any additional fees which may be required or credit overpayment to deposit account no. 50-2691. In particular, if this response is not timely filed, the Commissioner is authorized to treat this response as including a petition

15   to extend the time period pursuant to 37 CFR 1.136(a) requesting an extension of time of the number of months necessary to make this response timely filed and the petition fee due in connection therewith may be charged to deposit account no. 50-2691.
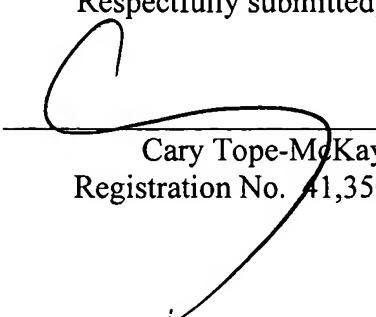
20

                                                           Respectfully submitted,

8/18/2008
_____
Date

                                                  Cary Tope-McKay
                                                  Registration No. 41,350

25

Cary Tope-McKay
TOPE-MCKAY & ASSOCIATES
23852 Pacific Coast Highway #311
Malibu, CA 90265

30   Tel: 310-589-8158
Mobile: 310-383-7468
Fax: 310-943-2736
E-mail: cmckay@topemckay.com